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ABSTRACT

An investigation, analyzing the linking of skeleton and syntactical rules of Madurese, presents counterevidence to Marantz's claims about the nature of reduplication, and to Carrier-Duncan's claim that reduplication must precede all phonological rules. It is proposed that reduplication in Madurese is not affixation, as Marantz claims, and can be determined only after all morphological and phonological rules have been applied. The rules of Madurese must apply in order: allomorphy (morpholexical), phonology, and then reduplication. The rules are considered for forming the most frequent type of reduplication in Madurese which is created by an exact copy of the final consonant-vowel-consonant (C-V-C) of the root after all morphological and phonological rules have been applied. The investigation concludes that it is impossible to derive the reduplication by mechanically repeating the entire stem of the word, and then lending part of its phonemic melody to the skeletal affix. Reduplication is a lexical process and the reduplication form is a copy of the parts of the phonetic representation of the stem; only then is it prefixed to the stem in a position determined by the other morphemes in the word and by the particular derivation. Extensive examples are included. (DJD)

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by

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REDUPLICATION IN MADURESE

Alan M. Stevens
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In a recent article Marantz (1982) has suggested that reduplication be treated as a skeletal affix in the form of a series of C and V prefixed to the stem being reduplicated. This skeletal morpheme lacks a phonemic melody; instead, the affix borrows (or copies) it from the phonemic melody of the stem. He gives numerous examples in support of this hypothesis. In most cases the linking of the reduplication skeleton to the reduplicated stem is from left to right. However, he does mention Madurese, a language in which the linking, he claims, is in the unusual order of from right to left. In this article I will look at the Madurese evidence in greater detail in order to see whether the analysis Marantz suggests for all reduplications fits this language.

My conclusion is that reduplication, at least in Madurese, contrary to Marantz's hypothesis, is not affixation; its form can only be determined after all morpholexical and phonological rules have applied. It is a copy of phonetic information from the stem (see Carrier-Duncan 1984:260-1). The rules of Madurese must apply in the order: allomorphy (morpholexical), phonology and then reduplication, contrary to Carrier-Duncan's claim (1979) that all allomorphy rules precede all phonological rules, with reduplication, considered as a form of allomorphy, forming the border between allomorphy and phonology.

Marantz's main conclusion (1982:480) is that "...reduplication is best analyzed as the affixation of a skeletal morpheme to a stem..." In the simplest cases there is a skeleton whose C's and V's are borrowed from a duplicate of the stem. The least complicated example that Marantz gives (1982:447) is that of Agta as shown in (1). In this case the skeletal prefix is of the form CVC-.

(1)

	takki		takki	takki		
	' ' ' ' '		' ' ' ' '	' ' ' ' '		
CVC+[CVCCV]	→	CVC		+CVCCV	=	taktakki 'legs'

After giving a number of other examples and four general principles Marantz (1982:451) mentions an example from Madurese, "which links to phonemic melodies from right to left." His example is shown in (2).

(2)

	buwaq-an		buwaq-an	buwaq-an		
	' ' ' ' '		' ' '	' ' ' ' '		
CVC+[CVCVC]	→	CVC		+CVCVC	=	waq-buwaq-an 'fruits'

As we will see, Marantz has misinterpreted the Madurese data and the process of reduplication in this language.

Madurese has three types of reduplication. Two of the three have been discussed in the literature on related languages such as Tagalog: full lexical reduplication of the entire word or of

a sequence of morphemes within the word, e.g., (3a) and initial CV reduplication, e.g., (3b).

(3) a. paŋlat^{h}in+paŋlat^{h}in 'servants'
b. nonoles 'keep on writing'

I will not be discussing these two types in this paper. In addition, Madurese has the type mentioned by Marantz. This type, which I will refer to as R, is by far the most frequent of the three. It consists of an exact copy of the final (C)V(C)[1] of the root after all morpholexical and phonological rules have applied. It is then placed in the sequence of prefixes in a spot which is determined by the particular derivation and the other prefixes with which it concatenates. In the body of this paper I will discuss the relevant rules. Some examples are given in (4).

(4)

	underlying stem	gloss	surface stem	R	gloss
a.	moa	face	mõɰ̃	ɰ̃+mõɰ̃	faces
b.	a-oba	change	a-ɔbʏ	a+bʏ+ɔbʏ	change often
c.	e-bəle	be bought	ɛ-bɨlli	ɛ+li+bɨlli	be bought often

It is obvious that the form of the reduplication R cannot be determined until the rules for the pronunciation of the consonants and vowels have applied.

Madurese is an Austronesian language spoken by about 6 million people on the island of Madura, off the northeast coast of Java in Indonesia, and on the eastern end of Java itself. Its system of consonants (5) is richer than that of the closely related languages Javanese, Balinese and Malay/Indonesian. The symbols used here are slightly different from those used in Stevens (1968).

(5)

bilabial	dental	alveolar	palatal	velar	glottal	
p	t	T	c	k		[-vd,-asp]
p^{h}	t^{h}	T^{h}	c^{h}	k^{h}		[-vd,+asp]
b	d	D	j	g		[+vd]
m	n		ɲ	ŋ		[+nas]
	s					[+cont]
	r l		y		?	[+son,-nas]

Note that in native words *y* is the only glide at the underlying level; even so, it is restricted to morpheme-final position. Both *y* and *w*, however, occur at the phonetic level as the result of a rule of glide insertion. All consonants but glottal stop also occur geminated.

Madurese has only four vowels (6)--front unrounded, back rounded and two unrounded back vowels, one higher and one lower. Each vowel has at least two pronunciations, tense and lax.[3] I take the lax set to be underlying since these are the pronunciations

which occur in initial position and so are not affected by the preceding sounds. In certain environments these lax vowels are tensed by a rule of vowel tensing (VT). The chart in (6) shows the symbol used for the underlying vowel and both the lax and tense pronunciations.

(6)

underlying	lax	tense
e	ɛ	i
ə	ə	ɨ
o	ɔ	o
a	a	ʏ

Tensing takes place after voiced and aspirated consonants and is iterative from left to right, within a morpheme or across a morpheme boundary, through any number of nonnasal sonorants, i.e., liquids and glides, or zero, and through the fricative *s* if and only if it is at a morpheme boundary.[3] Everywhere else the vowels remain lax. Examples of all these environments are given in (7) through (10).

In the examples given in (7) the environment for tensing is not present; all vowels are lax.

(7)

underlying	derived by VT	gloss
a. esse	ɛssɛ	contents
b. əla	əllaʰ	already
c. oreŋ	ɔrɛŋ	person
d. ale?	alɛ?	younger sibling

In the examples given in (8) VT applies only once for each environment, after a voiced or an aspirated obstruent.

(8)

a. kʰose	kʰusɛ	gums
b. bato	bʏtɔ	stone
c. pʰakʰos	pʰʏkʰus	good

In the examples given in (9) the rule applies iteratively within a morpheme, i.e., through a nonnasal sonorant or zero.

(9)

a. baras	bʏrʏs	healthy
b. cʰela	cʰilʏ	tongue
c. pʰao	pʰʏu	shoulder
d. ballo	bʏllu	eight
e. bəle	bɨlli	buy

In the examples given in (10) the rule also applies iteratively through a nonnasal sonorant or *s* at a morpheme boundary.

(10)

a. c^ha-lao?	c^hɤlɤu?	to the south
b. ŋ-aŋk^hoy-e	ŋãŋk^huyi	to use
c. ka-p^{h}ak^{h}os-an	kap^{h}ɤk^{h}usɤn	goodness
d. kərp^{h}oy-na	kərp^{h}uyyɤ[5]	his water buffalo
e. k^{h}op^{h}ar-na	k^{h}up^{h}ɤrrɤ	his going home

A glide insertion rule (GI) applies before the vowel tensing rule.[6] A glottal stop is inserted between like vowels; between unlike vowels, if the first vowel is nonlow, a glide of the same rounding as the first vowel is inserted, i.e., VV → VyV if the first vowel is [-lo,-rd], and VV → VwV if the first vowel is [-lo,+rd]. Sequences of schwa plus a vowel or of a vowel plus schwa do not occur in Madurese.

After GI has applied, vowel tensing will affect the entire sequence of vowel-glide-vowel as mentioned in the VT rule given above. Examples appear in (11). In all cases, both within a morpheme and across a morpheme boundary, VT will apply iteratively.

(11)

	underlying	glide insertion	vowel tensing	gloss
a.	leer	le?er	lɛ?ɛr	neck
b.	baa	ba?a	bɤ?ɤ	flood
c.	baraa	bara?a	bɤrɤ?ɤ	eclipse
d.	seaŋ	seyaŋ	seyaŋ[7]	afternoon
e.	rop^{h}ea	rop^{h}eya	rɔp^{h}iyɤ	wife
f.	baD-a	baDa?-a	bɤDɤ?ɤ	there will be
g.	p^{h}erse-e	p^{h}erse?-e	p^{h}ɨrsɛ?ɛ	clean!

Another rule that applies after glide insertion is nasalization. Nasality spreads rightwards from a nasal consonant until it reaches a nonconsonantal segment, i.e., it spreads through vowels and glides (both oral and laryngeal), affecting all segments in its path. Two examples are given in (12). Nasalized vowels will never be tense since nasals do not trigger tensing.

(12)

	underlying	glide insertion	nasalization	gloss
a.	moa	mowa	mõ^{w}ã	face
b.	neat	neyat	nẽ^{y}ãt	intention

Madurese also has a rule of nasal substitution (NS) which is similar to the rule in Tagalog which has received so much attention in the literature. The part of the rule that is of interest here replaces a stem-initial unaspirated stop with a homorganic nasal[8] after a prefix-final ŋ, deleting the ŋ. This rule must be considered a morpholexical rule since not all prefixes which end in ŋ behave this way, since it is only totally regular if the stem begins with a voiceless obstruent (see (13b)) and since different derivatives of the same root sometimes behave differently

with respect to this rule. If the stem begins with a voiced stop, the rule applies for some morphemes (see (13f)) but not for others (see (13g)). In the remaining cases, i.e., stems beginning with voiced stops where NS does not apply, and all stems beginning with aspirated stops (see (13e)) or with nonsyllabic sonorants (see (13c,d)), this prefix usually surfaces as a prefix *a-*. Examples of all these types are given in (13).

(13)	underlying	surface	gloss	stem type
a.	ŋ-aku	ŋãkɔ	confess	vowel
b.	ŋ-totop	nɔ̃tɔp	close	[-vd,-asp]
c.	ŋ-rosak	arɔsak	break	liquid
d.	ŋ-ñata-ak^{h}e	añãta?ak^{h}i	prove	nasal
e.	ŋ-T^{h}aar	aT^{h}ʏ?ʏr	eat	[-vd,+asp]
f.	ŋ-bəle	mɔ̃llɛ	buy	[+vd] NS applies
g.	ŋ-bale?	abʏli?	turn over	[+vd] NS doesn't apply

Whatever the exact form of this rule, it must apply before all the other rules discussed up to this point. It therefore must precede all the phonological rules, as we would expect for a morpholexical rule.

Note that the application or nonapplication of Nasal Substitution can affect the quality of the vowels in the stem. Compare, for example, the vowels in the final syllables of (13f) and (13g). In the former, Nasal Substitution has applied, as a result of which the vowel in question is lax; but in (13g) Nasal Substitution has not applied and so the final vowel is tense. Another example is given in (14). Compare the vowel in the final syllable of the passive (14a), where Nasal Substitution plays no role, to the final vowel of the active (14b), where this rule applies. In (14a) that vowel is tense and in (14b) it is lax.

(14)	underlying	NS	GI	nasalization	VT[9]	gloss
a.	e-bəle	--	--	--	ɛbɨlli	be bought
b.	ŋ-bəle	məle	--	mɔ̃le	mɔ̃llɛ	buy

The application or nonapplication of the nasalization rule, as a result of whether Nasal Substitution applies or not, also affects the nasality of the vowels, as can be seen by comparing (15a), which contains oral vowels, with (15b), which contains nasal vowels.

(15)

a.	soon	--	so?on	--	sɔ?ɔn	request
b.	ŋ-soon	ñoon	ño?on	ñõ?õn	ñɔ̃?ɔ̃n	id. (verb)

As we will see below these differences have consequences for the form of the reduplication.

In his article Marantz examines the interaction of reduplication and phonological processes. He notes that it has been pointed out in the literature that in interacting with reduplication phonological processes frequently either do not apply when they should (he calls this underapplication) or do apply when they should not (he calls this overapplication). He goes on to explain these odd phenomena in two ways. In the first class of cases we find phonological processes that do not apply within the reduplicating affix although their environments are met there. He explains these by claiming that they are cases of cyclic rules; according to Mascaró (1976) and Halle (1979) they should not apply within morphemes in nonderived environments.

Marantz explains the second class of cases, the remaining types of over- and underappplication of phonological processes to reduplicated forms, by claiming that they meet the criteria to be considered morpholexical processes (see Lieber (1980)) and therefore not phonological rules at all, but rather rules which express the relationships between allomorphs of a morpheme.

The first type, where the phonological rules do not apply within the reduplicating form, are not found in Madurese. What we find are (1) the apparent overapplication of phonological rules in the reduplicating form in environments where they should not occur, and (2) the apparent underapplication of the rules of the language across the boundaries between the reduplicating form and the adjacent morphemes, i.e., the phonological rules of the language, which normally apply across the boundary between adjacent morphemes, are blocked here. I have marked this boundary by a + rather than by a - for this reason.

The overapplication of the phonological rules in the reduplicating form cannot be explained by appealing to the notion of allomorphy rules (Aronoff:1976) or morpholexical rules (Lieber:1980 and Stevens:1984). Except for Nasal Substitution the rules in question here are completely regular both within morphemes and across all boundaries, except the one under discussion; most of them are low-level rules. In no sense can the output of these rules be considered allomorphs resulting from morpholexical rules. It might be possible, however, to explain the apparent underapplication of the rules across the boundaries of the reduplicating form by appealing to this notion. However, it also can be explained by ordering reduplication after all the other rules.

Reduplication in Madurese has the meanings of plurality, frequency of action and to do the action in a non-directed way, among others. In addition, it frequently combines with prefixes and suffixes where the meaning of the whole is not clearly a combination of two distinct meanings but rather a single meaning. In one such case R+root-an means 'collective plural'. While both R and -*an* occur elsewhere, it is not clear that this derivative is a combination of the meanings of the two. Another case is R+ŋ-pa-stem meaning 'pretend to do the action'. ŋ-pa- elsewhere in the language has an active causative meaning. Many other such opaque combinations of R plus affix occur in Madurese. In these cases the prefix or

suffix must be attached to the stem before the reduplication.

In Madurese the reduplication R is a prefix which is an exact phonetic copy of the final $(C_1)V(C_2)$ of the root after all rules have applied. It is frequently the case, therefore, that the rules of the language appear to overapply in the reduplicating form since the environment is not present in that form itself but rather in the stem, of which the reduplication is merely a partial copy. This shows that reduplication in this language is not simply affixation.

The details of the formation of reduplication in Madurese are as follows. C_1 is the consonant, if there is one, which begins the final syllable of the root. This includes the oral glides generated by the glide insertion rule (see (16a,b,c)) but does not include the glottal stop generated by this rule since glottal stop in this language always belongs to the preceding syllable.

The vowel of the reduplication is phonetically exactly the root-final vowel resulting from the application of all the rules. For examples see (16).

The final consonant of the reduplication, C_2, is more complicated. In general it will be the final consonant of the root, regardless of whether that is the consonant which ends the final syllable of the root. It is not simply the final syllable of the root which is copied in the reduplication since if the final consonant of the root is both preceded and followed by a vowel, where the following vowel is part of a suffix, the syllabification rules of the language will cause the root-final vowel to be syllabified with the following vowel and not with the preceding vowel. Regardless of this, C_2 will be the final consonant of the root. For an example see (16d). The syllabification of the stem in this example is *mə-ə-nəŋ* but the reduplication form is *əŋ* and not just *ə*.

C_2 can also be any consonant which is added to the final syllable of the root, even if this consonant was not underlyingly part of the root. Only glottal stop or *n* can have this effect. There are two possible sources of such glottal stops. The first source (see (16e)) is a glottal stop generated by the glide insertion rule. Since glottal stop between vowels, as already mentioned, is the coda of the preceding syllable any glottal stop generated at the end of the root will be added to the final root syllable and will therefore be copied in the reduplication form. The oral glides, *y* and *w*, generated by the Glide Insertion rule will not be copied as C_2 since they do not close the preceding syllable in that position.

There are also a small number of cases where glottal stop is a separate suffix by itself. In such cases, as for example in (16f) it is also copied in the reduplication form as C_2.

There are some instances of an *n* which is added to the end of the root syllable and therefore is copied as part of the reduplication. This *n* is either a non-productive suffix *n*, possibly a reduced form of the suffix *-an*, or is simply a consonant inserted in some derivatives of some roots between the end of a vowel-final root and a vowel-initial suffix. For examples see (16g and 16h).

A good example of a case in which a generated glottal stop is copied in the reduplication is the form used by Marantz and repeated in (2) above. In (16j) we see that the root is *boa* 'fruit' and the derivative is a collective plural formed by first suffixing *-an* and then reduplicating.

(16)

	root	underlying stem	surface stem	R	gloss
a.	k^hoa	--	$k^huwʏ$	$wʏ+k^huwʏ$	caves
b.	moa	--	mõ$\tilde{ʊ}$ã	$\tilde{ʊ}ã+mõ\tilde{ʊ}ã$	faces
c.	neat	--	nã$\tilde{ɣ}$ãt	$\tilde{ɣ}ãt+nã\tilde{ɣ}ãt$	intentions
d.	maen	maen-an	mãẽn-ãn	ẽn+mãẽnãn	toy
e.	taña	a-taña-a	a-taña?-ã	a+ñã?+taña?ã	will ask often
f.	tɛlo	tɛlo-?	tɛllɔ-?	lɔ?+tɛllɔ?	in threes
g.	k^heba	k^heba-n	$k^hibʏ$-n	bʏn+$k^hibʏn$	gift
h.	asta	ŋ-asta-n-e	ŋãstan-ã	tan+ŋãstanã	hold
i.	barampa	barampa-n	bʏrʏmpan	pan+bʏrʏmpan	several
j.	boa	boa-an	buwʏ?-ʏn	wʏ?+buwʏ?ʏn	fruits

The reduplicated syllable will also, of course, differ depending on whether the Nasal Substitution rule has applied, as in (17a), or not, as in (17b), and on whether the nasalization rule has applied, as in (17c), or not, as in (17d).

(17)

a.	bɛle	e-bɛle	ɛ-bílli	ɛ+li+bílli	be bought
b.	bɛle	ŋ-bɛle	mɛ̃llɛ	lɛ+mɛ̃llɛ	buy
c.	soon	--	sɔ?ɔn	ɔn+sɔ?ɔn	request
d.	soon	ŋ-soon	ñ5?5n	5n+ñ5?5n	id. (verb)

The only remaining problem with C_2 is what happens when certain suffixes are added to stems that end in a voiceless unaspirated stop. When such a stop is followed by a suffix beginning with a vowel, it changes to the homorganic aspirated stop (see (18a)), and when it is followed by the suffix *-na* 'third person possessive, definitizer,' it changes to a homorganic aspirated geminate (the result of applying the assimilation rule mentioned in footnote 5 and then the aspiration rule just given). For an example see (18b). I have written aspirated geminates as CC^h.

The only stops which occur in word or syllable-final position are the voiceless unaspirated stops. C_2 of the reduplication form will always show the unaspirated stop, not the aspirated stop resulting from the rule (see (18a) for an example). Rather than treat this problem by reordering the rules so that reduplication takes place before the rule just mentioned, it would be better to

deal with it by a phonotactic constraint which will not allow aspirated stops in syllable-final position and therefore they will not appear as C_2 of the reduplication form. The second process, exemplified in (18b), causes no problem since the geminate aspirate can be divided phonetically into two consonants--an unaspirated stop plus an aspirated stop. Reduplication will only copy the unaspirated first consonant.

(18)	underlying	surface	gloss	R surface
a.	orok-a	ɔrɔkʰʏ	will increase	rɔk+ɔrɔkʰʏ
b.	orok-na	ɔrɔkkʰʏ	its increase	rɔk+ɔrɔkkʰʏ

As we saw in the word for 'fruits' (16j) the suffixes must be added first and then the reduplication. This is also true for prefixes. For example, the prefix ŋ which triggers Nasal Replacement must be attached first. If Nasal Replacement applies, R appears immediately in front of the root, which now begins with a nasal consonant. If Nasal Replacement does not apply and the prefix becomes *a*-, however, the reduplication still goes in front of the root, but after the prefix *a*-. For examples see (19a and 19b).

(19)	underlying	surface	reduplicated	gloss
a.	ŋ-kakan	ŋãkan	kan+ŋãkan	eat
b.	ŋ-kʰeba	a-kʰibʏ	a+bʏ+kʰibʏ	carry

There are, however, some derivations in which the reduplicated form appears before another prefix rather than immediately before the root, e.g., the derivative which means 'pretend to' has the form R+ŋ-pa-ROOT. An example is given in (20) from the root for 'stupid.'

(20)	root	surface	derivative	gloss
	pʰoTʰo	pʰuTʰu	Tʰu+mapʰuTʰu	pretend to be stupid

There are also a number of prefixes such as *pa*- 'causative' and *ka*- 'resultative' for which the reduplication form can either go in front of the root or in front of the prefix. This variation in position is more characteristic of a separate lexeme surrounded by internal word boundaries than it is of an ordinary affix.

It is not possible, in this language, to derive the reduplication by mechanically repeating the entire stem and then lending part of its phonemic melody to a skeletal affix. The kind of reduplication that I have been discussing and the total morpheme reduplication which also occurs in this language are two separate and distinct processes in Madurese. They cannot substitute for each other and they do not always appear in the same position in the string of morphemes. In any case, it is not enough to know the phonemic melody of the stem; we must know the exact phonetics,

in particular what happens at the boundaries between the root and any affixes. To return to the example that has been given a number of times we see in (16j), the example that Marantz quotes, that the Glide Insertion rule must apply between the root and the suffix in order for the glottal stop generated by this rule to be available for the reduplication. If we simply copy the entire root, as Marantz does, we will not have the glottal stop available as the final consonant of the reduplication form.

By ordering reduplication after all morpholexical and phonological processes it is also possible to explain the two other types of reduplication in Madurese exemplified in (3). For example, (3a) can be explained by applying all rules to the stem and then copying the entire word. In (3b) all rules, including Nasal Substitution, apply, and then the initial CV is copied.

The conclusion I draw from the Madurese material is that, at least in this language, reduplication is a lexical process and the reduplication form is a copy of parts of the phonetic representation of the stem; only then is it prefixed to the stem in a position determined by the other morphemes in the word and by the particular derivation. Once in place it acts like an element surrounded by internal word boundaries, i.e., none of the rules of the language operate across either of its boundaries.[10] It also constitutes a separate syllable; the usual syllabification rules of the language do not operate across its boundaries.

This then is counterevidence to Marantz's claims about the general nature of reduplication and also to Carrier-Duncan's claim that reduplication, as a form of allomorphy, must precede all phonological rules. A similar countercase has been reported by Odden and Odden for a Bantu language (1985).

FOOTNOTES

1. In a few borrowed roots, such as *estre* 'wife,' which contain a sequence of three intervocalic consonants, both the second and the third consonants are copied in the reduplication, i.e., *tre-estre* 'wives'.
2. Some phonetic details have been omitted, e.g., /e/ is higher when nasalized. I have written this [ẽ].
3. For details see Stevens (1980).
4. Another rule geminates consonants between schwa and a vowel.
5. A previous rule totally assimilates the *n* of the suffix *-na* to all preceding consonants except glottal stop.
6. If GI applies before VT, the rules are simpler to write. The order of these two rules is, in any case, irrelevant to the question of reduplication.
7. The lax forms of /e/ and /o/ are higher before the glides *y* and *w* respectively. I have written these as [e] and [o].
8. However, ŋ → m̃ / __-s, e.g. ŋ-soon → m̃oon 'request'.
9. Other rules have also applied to give the surface form.
10. There are, however, some lexicalized forms in which the vowel

tensing rule applies across the boundary between the reduplication and the stem, e.g., aDa? 'ahead' and reduplicated [Dʏ?ʏDʏ?] 'first (to do something)'. There are also some rapid-speech phenomena at this boundary.

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